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U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF ANIMAL INDUSTRY.—BULLETIN NO. 87

A. D. MELVIN, CHIEF OF BUREAU

HAMPDEN-SIDNEY COLLEGE
Hampden-Sidney, Va.

MARKET MILK INVESTIGATIONS.

II.—THE MILK AND CREAM EXHIBIT AT THE NATIONAL DAIRY SHOW, 1906.

BY

CLARENCE B. LANE, B. S.,

Assistant Chief of Dairy Division, Bureau of Animal Industry.

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BY

CLARENCE B. LANE, B. S.,

Assistant Chief of Dairy Division, Bureau of Animal Industry.

WASHINGTON:

GOVERNMENT PRINTING OFFICE.

1906.

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LETTER OF TRANSMITTAL.

U. S. Department of Agriculture,
Bureau of Animal Industry,
Washington, D. C., June 16, 1906.

Sir: I have the honor to transmit the accompanying manuscript entitled "The Milk and Cream Exhibit at the National Dairy Show, 1906," by Clarence B. Lane, assistant chief of the Dairy Division of this Bureau, and to recommend its publication as a bulletin in the series of the Bureau.

This milk and cream competition, which was under the direction of the Dairy Division, was a new departure in connection with dairy shows in this country, and the very satisfactory outcome warrants a wide dissemination of the data obtained. The practical results are calculated to be of great educational value to our dairymen and farmers, as they emphasize the importance of sanitary conditions and methods in the production of milk.

Respectfully,

A. D. Melvin,
Chief of Bureau.

Hon. James Wilson,
Secretary of Agriculture.

INTRODUCTION.

This bulletin is the second in a series on Market Milk Investigations. The first number, which was not given the general title now adopted for this series, is Bulletin No. 73, "The Bacteria of Pasteurized and Unpasteurized Milk," by L. A. Rogers. The work to be reported in this series will consist of investigations in the problems involved in the handling of market milk from production to consumption. It is the intention to confine the series to original research work by members of the Dairy Division or under its direction.

The present bulletin treats of an experiment in scoring or judging the value of market milk and cream as conducted by Mr. C. B. Lane, Assistant Chief of the Dairy Division, at the National Dairy Show, Chicago, in February, 1906. An attempt was made to determine ways and means of giving a fair and accurate score in this class of dairy products. Butter, cheese, and other products have been for years judged as to their quality in contests and on the market, a numerical score being given to indicate their value. This bulletin treats of the methods used in the Chicago test, with lessons learned from the course of the work.

Much credit should be given to the officers of the National Dairy Show Association and to the Chicago Board of Health for the interest shown and the assistance rendered in making the test a success.

ED. H. WEBSTER,
Chief of Dairy Division.

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THE MILK AND CREAM EXHIBIT AT THE NATIONAL DAIRY SHOW, 1906.

INTRODUCTORY.

Like many other features of the National Dairy Show held at Chicago, Ill., February 15–24, 1906, the milk and cream exhibit was designed to be educational in its scope and to show some of the possibilities in the handling and keeping of these products. The handling of dairy products is of greater importance to the health of the people consuming them than the production. The most indifferent dairy farmer can produce milk and cream, but it requires knowledge and skill to handle them properly.

For a number of years the National Creamery Buttermakers' Association, as well as State dairy associations, have called for exhibits of butter and cheese at their annual gatherings and offered medals and diplomas for those products receiving the highest scores. It seemed very proper, therefore, that the milk producer should have an opportunity to exhibit his product and have it scored in a similar way. The National Dairy Show at Chicago seemed to offer a most excellent opportunity for such an exhibit, hence the Dairy Division of the Bureau of Animal Industry secured space and called for exhibits of milk and cream from all dairymen throughout the country who could be reached through the medium of the dairy papers and by means of press bulletins.

Much interest was exhibited in the contest from the start and applications for entry came from many sections of the country, the most distant points being Massachusetts on the east, Maryland on the south, and Kansas on the west. Thirteen States were represented in all.

CLASSIFICATION OF THE EXHIBITS.

The exhibits were divided into three classes, as follows:

Class I. Certified milk.—This comprised all milk sold under a guaranty as to its purity, chemical composition, and bacterial content, most milk of this class being produced by expert dairymen in various localities under the direction of the local milk commissions.

Class II. Market milk.—A large percentage of the milk supply of our cities was covered by this class, which of course included all milk that is not sold under any guaranty as to its character.

Class III. Cream.—This was to be sweet cream, unpasteurized and free from preservatives. In fact it was specified that none of the products should be pasteurized. Pasteurized products were not included, principally because the work was more in the nature of an experiment and it was thought best not to include too many classes in the first attempt.

CONDITIONS OF ENTRY.

Separate entry blanks were prepared for each class, but, as they were all quite similar, only one—that for market milk—is presented here.

[National Dairy Show. Milk and cream section, under the direction of the Dairy Division, Bureau of Animal Industry, U. S. Department of Agriculture.]

OFFICIAL ENTRY BLANK.

MARKET MILK (CLASS II).

P. O. address: ——— ———.

Date: ———, *1906.*

E. SUDENDORF, *Chicago, Ill.,*

Secretary, National Dairy Show Association:

Please enter for me 12 quarts of milk to compete for prizes offered by the association at Chicago, Ill., February 15–24, 1906, in accordance with the conditions herein prescribed.

(Signed) ——— ———.

Rules: (1) Exhibitors can make only one entry. This must include 12 quarts of milk in bottles (quarts or pints) placed in a box suitable for shipping. (2) The milk to be the property of the association. (3) Every exhibitor is required to fill out and sign the following certificate:

I, ——— ———, hereby certify that the milk entered in this competition is a fair sample of the product sold by me, that it is free from preservatives, and that it has not been pasteurized or sterilized. I further state that I do not claim or advertise to produce "certified" milk.

(Signed) ——— ———.

(Proprietor) ——— ———.

(Signed in my presence) ——— ———.

The above must be signed by the proprietor, secretary, or manager, and a disinterested party.

JAS. A. WALKER, *President.*

E. SUDENDORF, *Secretary.*

HOW TO COMPETE.

Milk, to compete for prizes, must be sent by express from station nearest the producer, direct to E. Sudendorf, secretary, National Dairy Show Association, care Chicago Cold Storage and Warehouse Company, Sixteenth street and Indiana avenue, Chicago, Ill., and express receipt must accompany entry blank. Express charges on exhibits must be prepaid to destination.

The package should be iced and carefully wrapped, the shipping tag plainly addressed, on outside; also card tacked on box inside the wrapping, plainly giving sender's name and address, so as to avoid mistakes in identifying packages.

In order that the milk entered by the exhibitors may be of the same age when scored, it is hereby specified that it shall be drawn from the cows February 12 and shipped by express as soon thereafter as possible.

The secretary or his representative will be on hand to take charge of milk on its arrival and will see that it is properly cared for.

It is desirable that the package be plainly marked in some way giving the name of the exhibitor, and that the bottles, caps, etc., be such as are used in the regular trade, thus giving an individuality to each exhibit. It is also desired, if possible, that a photograph of either the interior or exterior of your dairy barn or dairy house accompany the application for use in the exhibit.

Only these official entry blanks furnished by the secretary will be accepted.

QUESTIONS TO BE ANSWERED BY EXHIBITORS.

1. Give date and hour this milk was drawn from the cow: ———.
2. Give date and hour this milk was delivered to the express company: ———.
3. Does this milk fairly represent the average product of your herd in quality and cleanliness? ———.
4. How was the milk treated from the time it was drawn from the cow until shipped? ———.

Remarks: ———.

SCORING THE MILK AND CREAM.

The idea of scoring milk and cream on a basis similar to that used for butter, and having score cards giving a certain number of points for flavor, composition, and bacterial content, is entirely new, but this plan was carried out in the present instance with most satisfactory results. In fact, much less difficulty was experienced by the judges in deciding upon the various points than was anticipated. As already stated, all the milk and cream entered in this contest was produced on February 12 and was packed in ice and shipped to a cold-storage house in Chicago. The scoring was done February 15, when the product was three days old.

JUDGES AND EXPERTS.

It was planned at the outset to give the products exhibited the most careful and rigid examination possible on all points, so that the final results would be beyond question. The judges were C. B. Lane, assistant chief of the Dairy Division; W. A. Stocking, jr., bacteriologist, Storrs Experiment Station, and Ivan C. Weld, instructor in dairying, New Hampshire College. In addition to the judges, two experts from the Dairy Division were employed to make tests, namely, C. E. Gray, chemist, and L. A. Rogers, bacteriologist.

SCORE CARDS.

The score cards used in each class are presented herewith. While some minor changes would probably be made if the work were repeated, in general it may be said that they were satisfactory to all concerned.

[National Dairy Show, Chicago, Ill., February 15–24, 1906.]

MILK JUDGING—CLASS I (CERTIFIED MILK).

Under the direction of the Dairy Division, Bureau of Animal Industry, U. S. Department of Agriculture.

Score for sample marked: .....

NUMERICAL SCORE.

Perfect, 100 points.	Flavor, 40 points.	Chemical qualities, 20 points.	Keeping qualities, 30 points.	General condition and appearance of package and contents, 10 points.
Score.....				

Date: ———, 1906. Initials of Judge: ———.

DESCRIPTIVE SCORE.
(Check as found below.)

Flavor.	Chemical qualities.	Keeping qualities.	General condition and appearance of package and contents.
Perfect.	Perfect.	Perfect.	Perfect.
Bitter.	Fat below amount guaranteed.	Bacteria exceed guarantee.	Sediment.
Weedy.	Total solids below amount guaranteed.	Objectionable bacteria.	Unattractive.
Garlic.		Excessive acid.	
Silage.		Sour.	
Cowy.			

[National Dairy Show, Chicago, Ill., February 15–24, 1906.]

MILK JUDGING—CLASS II (MARKET MILK).

Under the direction of the Dairy Division, Bureau of Animal Industry, U. S. Department of Agriculture.

Score for sample marked: .....

NUMERICAL SCORE.

Perfect, 100 points.	Flavor, 40 points.	Chemical qualities, 25 points.	Keeping qualities, 25 points.	General condition and appearance of package and contents, 10 points.
Score.....				

Date: ———, 1906. Initials of Judge: ———.

DESCRIPTIVE SCORE.
(Check as found below.)

Flavor.	Chemical qualities.	Keeping qualities.	General condition and appearance of package and contents.
Perfect.	Perfect.	Perfect.	Perfect.
Bitter.	Fat below 3.25 per cent.	Bacteria exceed 100,000 per c. c.	Sediment.
Weedy.	Total solids below 12 per cent.	Objectionable bacteria.	Unattractive.
Garlic.		Excessive acid.	
Silage.		Sour.	
Cowy.			

[National Dairy Show, Chicago, Ill., February 15-24, 1906.]

CREAM JUDGING—CLASS III.

Under the direction of the Dairy Division, Bureau of Animal Industry, U. S. Department of Agriculture.

Score for sample marked: .....

NUMERICAL SCORE.

Perfect, 100 points.	Flavor, 40 points.	Chemical qualities, 20 points.	Keeping qualities, 25 points.	General condition and appearance of package and contents, 15 points.
Score.....				

Date: ———, 1906. Initials of judge: ———.

DESCRIPTIVE SCORE.

(Check as found below.)

Flavor.	Chemical qualities.	Keeping qualities.	General condition and appearance of package and contents.
Perfect.	Perfect.	Perfect.	Perfect.
Bad odor.	Wide variation from guaranteed percentage of fat.	Excessive number of bacteria.	Frothy.
Bitter.	Fat.	Objectionable bacteria.	Lumpy.
Weedy.	Solids not fat.	Excessive acid.	Sediment.
Garlic.	Total solids.	Sour.	Unattractive
Silage.			
Cowy.			

TESTS FOR FLAVOR.

Flavor was given the most points on the score card in all three classes for the reason that it was considered the most important. Unpalatable milk or cream is of practically no value as an article of food; on the other hand, if these products contain a low percentage of fat or solids not fat or an excessive number of bacteria and still have a good flavor, they may be utilized, and, in fact, more or less milk and cream of this character is used. Hence we see that flavor is of the first importance.

Before making the tests the samples of milk were heated in a water bath to a temperature of about 100° F. This heating seemed to bring out objectionable flavors in a more marked degree than when the milk was cold, although tests were made of both the cold and warm milk. Tests for flavor in the cream samples were made in a similar manner. If one has never collected a promiscuous lot of samples and made tests of this character, he will be surprised how easily off-flavors may be detected and how much the quality of the flavor, so to speak, varies. Some of the samples tested seemed to

be almost entirely lacking in flavor, while others had a rich, pleasant flavor and aroma.

TESTS FOR CHEMICAL QUALITIES.

The following remarks are by C. E. Gray, who made the chemical tests:

The acidity of the milk and cream was determined by "Mann's test," the butter fat by the Babcock method, and solids not fat by the lactometer. In addition to these analyses all samples were tested for formaldehyde by Hehner's method. None of this preservative could be detected in any of the samples. All samples were tested for pasteurization by Stock's method. From this test it could not be determined conclusively that any of the samples had been pasteurized.

TESTS FOR KEEPING QUALITIES.

L. A. Rogers, who performed the bacteriological work, remarks as follows:

All plates were made with ordinary 2 per cent lactose gelatin and with dilutions varying from $\frac{1}{10}$ c. c. to $\frac{1}{10000}$ c. c. The counts were made after five days, excepting when the rapid growth of liquifying colonies made an earlier count necessary. In some cases it was evident from the acidity of the milk that the colonies of the lactic-acid bacteria had not developed at the time the bacteria on the plates were counted.

It is unsafe to generalize from the limited data obtained in this manner. However, many of the producers of these milks demonstrated that milk with a low bacterial content can be secured without the expensive apparatus usually found in the so-called sanitary dairies. Those who understand and observe the fundamental rules of cleanliness in the stable, where the great contamination of milk occurs, have little difficulty in producing milk with good keeping qualities.

APPEARANCE OF PACKAGES AND CONTENTS.

It is of interest to note the different styles of shipping cases in which the exhibits were sent (see pl. 1, fig. 1). Some were very neat (see pl. 1, fig. 2), and this goes a good way in selling milk. Many of them were made entirely of wood, others had a galvanized-iron case inside of a wooden box. All of the samples were heavily iced.

While only a few points were allowed on the score card for the appearance of the package and contents, this phase of the scoring is considered of sufficient importance to call for special attention. There is no excuse for the presence of dirt or sediment of any kind in milk or cream; it is an indication that it comes from an unclean dairy. Wherever such was found by the judges, six points were deducted, and several bottles were always examined to make sure that this criticism could justly be made on the whole shipment. Aside from sediment, the general appearance and neatness of the package was considered. Sometimes the caps fitted very poorly and in one or two instances tin tops were used, the latter not being desirable from a sanitary standpoint. In the case of the certified milk a number of styles of caps, coverings, and methods of sealing were presented, some of which were very attractive.

Fig. 1.—Some of the Shipping Cases Containing Samples of Milk and Cream.

Fig. 2.—A Good Shipping Case.

Fig. 1.—Styles of Bottles in Class I—Certified Milk.

Fig. 2.—Styles of Bottles in Class II—Market Milk.

(See description in text, page 13.)

A few samples of bottles and coverings are shown in plate 2, a brief description of which is as follows: Counting from left to right of figure 1—certified milk—the top of the first bottle has an outside covering of thin paper fastened with an elastic band; on this covering are stamped the words "Certified milk" and the name of the dairy. This covering prevents dust from reaching the inner cap; the latter, which fits tightly into the top of the bottle, is the ordinary paper pulp cap commonly used for milk bottles. The tops of the second and third bottles are neatly covered with tin foil, under which were ordinary paper caps covered with about one-eighth inch of paraffin. The tin foil and paraffin make the finish more expensive, but they are more satisfactory to the customer, and, altogether, these two bottles present the most attractive appearance. In addition to the above precautions the second bottle is fastened with a wire and lead seal. The fourth and fifth bottles are also covered with tin foil, but are not as attractive as the two just described, for the reason that the foil extends down too far on the bottle and looks ragged. These bottles have no paraffin under the foil, simply a plain cap. The last bottle to the right has a piece of thin rubber cloth fastened over the top with an elastic band; this keeps out all water and dust, but it is not very attractive. It will be noted that while the six bottles all hold the same amount of milk, there is quite a difference in their height, some having a short neck and others a tall slim neck, which makes the cream appear to have greater volume.

Turning to figure 2—market milk—we have quite a contrast in the style of bottles presented. Counting from the left, the first, third, and fourth are ordinary types of market milk bottles having ordinary caps. In the case of the first, however, about one-eighth of an inch of paraffin is filled in over the cap, making it air-tight and dust proof. The second bottle differs from the others in having the neck marked off in rings, indicating the number of ounces of cream on the top of the bottle. The fifth and sixth bottles have tin tops in addition to paper caps. This style of top is not considered sanitary and is gradually disappearing from the milk trade.

SCORES.

The numerical and descriptive scores are given in the following tables:

Numerical scores of the exhibits of certified milk, market milk, and cream.

CLASS I—CERTIFIED MILK.

Sample No.	Flavor (perfect 40 points).	Chemical qualities (perfect 20 points).	Keeping qualities (perfect 30 points).	General condition and appearance of package and contents (perfect 10 points).	Total score.
101	36	20	30	10	96
102	35	20	30	10	95
103	37	20	[a] [b] 20	10	87
104	38	20	30	10	98
105	37	20	30	10	97
106	35	20	30	10	95
107	35½	20	30	10	95½
115 [c]					

CLASS II—MARKET MILK.

Sample No.	Flavor (perfect 40 points).	Chemical qualities (perfect 25 points).	Keeping qualities (perfect 25 points).	General condition and appearance of package and contents (perfect 10 points).	Total score.
201	35	25	25	10	95
202	34	25	[d] 23	10	92
203	35	[e] [f] 17	[d] 23	[g] 9½	84½
204	33	25	25	10	93
205	30	25	[d] 23	10	88
206	33½	25	25	10	93½
207	34	25	25	10	94
208	30	25	25	10	90
209	33	25	25	10	93
210	32	25	25	10	92
211	30	25	25	[h] 4	85
212	37	[e] [f] 19	[a] [b] 17	10	83
213	36	25	25	10	96
214	33	25	25	[h] 4	87
215	35	25	25	[h] 4	89
216	30	25	[a] [b] 8	[g] 8	71
217	30	25	25	10	90
218	32	25	[a] [b] 19	10	86
219	35	25	24	3	87
220	35	25	25	10	95
221 [c]					
222	35	25	[a] 24	10	94
223	36	25	[b] 24½	10	95½

[a] Excessive bacteria.
[b] Objectionable bacteria.
[c] Barred from competition.
[d] Excessive acid.
[e] Fat below standard.
[f] Solids below standard.
[g] Imperfect package.
[h] Sediment.

Numerical scores of the exhibits of certified milk, market milk, and cream—Continued.

CLASS III—CREAM.

Sample No.	Flavor (perfect 40 points).	Chemical qualities (perfect 20 points).	Keeping qualities (perfect 25 points).	General condition and appearance of package and contents (perfect 15 points).	Total score.
301	36	20	25	15	96
302	33	20	[a] 23	[b] 10	86
303	36	[c] 19	25	15	95
304	35	20	25	15	95
305	37	20	[d e] 20	[f] 14	91
306 [g]					
307	34	20	[d] 23	[f] 14½	91½
308	37	20	25	15	97
309	37½	20	[e] 24	15	96½
310	38	20	[d e] 22	15	95
311	36½	20	25	[f] 14	95½
314	37	20	25	[f] 14	96
315	38	20	25	15	98
316	33	20	25	15	93
317	32	20	25	[f h] 9	86

[a] Excessive acid.
[b] Frothy and lumpy.
[c] Fat below standard.
[d] Excessive bacteria.
[e] Objectionable bacteria.
[f] Imperfect package.
[g] Barred from competition.
[h] Sediment.

Descriptive scores of the exhibits of certified milk, market milk, and cream.

CLASS I—CERTIFIED MILK.

Sample No.	Flavor.	Specific gravity.	Fat.	Solids not fat.	Total solids.	Acidity.	Total bacteria per cubic centimeter.	Liquefying bacteria per cubic centimeter.	Remarks.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*			
101	Good	1.0313	5.0	8.84	13.84	0.189	200	30	Slow liquefiers.
102	do	1.0303	5.3	8.64	13.94	.175	850	0	
103	Excellent	1.0324	4.1	8.93	13.03	.185	51,000	1,200	Potato bacillus.
104	do	1.0324	4.2	8.95	13.15	.198	2,500	500	Slow liquefiers.
105	do	1.0313	4.7	8.78	13.48	.193	120	30	Do.
106	Good	1.0313	3.8	8.60	12.40	.189	0	0	
107	Excellent	1.0313	4.7	8.78	13.48	.171	260	20	Potato bacillus.
115[a]									
	Average.		4.5	8.79	13.33	.186	7,847	254	

[a] Barred from competition.

Descriptive scores of the exhibits of certified milk, market milk, and cream—Continued.

CLASS II—MARKET MILK.

Sample No.	Flavor.	Specific gravity.	Fat.	Solids not fat.	Total solids.	Acidity.	Total bacteria per cubic centimeter.	Liquefying bacteria per cubic centimeter.	Remarks.
			P. ct.	*P. ct.*	*P. ct.*	*P. ct.*			
201	Excellent	1.0324	5.8	9.28	15.09	0.207	35,000	5,000	
202	Good	1.0345	5.8	9.56	15.36	.234	8,800	700	Liquefiers, various kinds.
203	Excellent	1.0355	2.6	9.38	11.98	.237	2,900	100	Slow liquefiers.
204	Good	1.0313	4.4	8.72	13.12	.196	900	0	
205	Strong	1.0324	6.0	9.33	15.33	.258	23,600	300	
206	Good	1.0303	5.5	8.67	14.17	.175	2,400	1,000	Do.
207	do	1.0318	5.0	9.22	14.22	.201	400	100	
208	Unpalatable	1.0318	3.6	8.93	12.53	.192	14,500	0	Spreading liquefiers.
209	Unpleasant	1.0328	4.4	9.10	13.50	.199	3,600	200	
210	do	1.0303	4.6	9.14	13.74	.171	3,300	500	Large spreading liquefiers.
211	Unpalatable	1.0318	5.0	8.96	13.96	.205	19,000	4,000	
212	Excellent	1.0303	3.2	8.22	11.42	.176	295,000	109,000	Liquefiers spreading, growth diffused.
213	Fine	1.0308	4.6	8.68	13.28	.198	6,000	600	
214	Unpalatable	1.0303	4.2	8.42	12.62	.180	13,800	2,600	Liquefiers large, spreading.
215	Good	1.0313	3.6	8.55	12.15	.172	6,000	2,000	Slow liquefiers.
216	Unpalatable	1.0324	4.2	8.95	13.15	.225	21,000,000	710,000	
217	do	1.0334	3.8	9.12	12.92	.221	900	0	
218	Unpleasant	1.0313	7.1	9.28	16.38	.183	241,000	72,000	Spreading liquefiers.
219	Good	1.0329	3.4	8.92	12.22	.189	57,000	10,000	Liquefiers, proteus like.
220	do	1.0318	4.2	8.55	12.75	.194	13,600	9,500	Liquefiers, small colonies.
221[a]									
222	Good	1.0335	4.0	9.19	13.19	.198	113,000	14,000	Liquefiers, spreading.
223	Excellent	1.0340	4.4	9.4	13.80	.214	41,000	8,900	Small colonies liquefiers.
	Average		4.5	8.98	13.49	.200	995,182	43,204	

CLASS III—CREAM.

301	Excellent		34.0			0.232	4,000	200	Slow liquefiers.
302	Bad		44.0			.270	1,200	500	Potato bacillus.
303	Excellent		17.0			.218	12,000	200	Slow liquefiers.
304	do		36.0			.187	88,000	4,000	Potato bacillus.
305	do		34.0			.217	2,810,000	43,000	Spreading liquefiers.
306[a]									
307	Good		29.0			.241	426,000	600	Do.
308	Excellent		26.0			.202	16,700	2,100	Do.
309	do		31.0			.171	98,000	25,000	Do.
310	do		31.0			.171	256,000	76,000	Liquefiers spreading, various kinds.
311	Good		25.0			.176	0	0	Liquefiers spreading.
314	Excellent		36.0			.180	2,300	100	Potato bacillus.
315	do		27.0			.198	46,000	8,600	Liquefiers slow, yellow color.
316	Bitter		34.0			.203	166,000	14,000	Liquefiers spreading.
317	Cowy		(b)			.207	104,000	7,000	Liquefiers spreading, growth diffused.
	Average		31.0			.205	287,871	12,950	

[a] Barred from competition.

[b] Fat per cent not determined.

THE AWARDS IN CLASS I—CERTIFIED MILK.

There were eight entries in this class, and none of them had a disagreeable flavor, but there was a great difference in the quality or pleasantness of the flavor. The chemical qualities of the milk received most careful attention, and the percentage of butter fat ranged from 3.8 to 5.3, averaging 4.5. The percentage of total solids ranged from 12.40 to 13.94, and averaged 13.33. The variation was, therefore, within comparatively narrow limits, which of course would naturally be expected in milk of this class. The number of bacteria in the certified milk samples ranged from 0 to 51,000 per cubic centimeter. The number of putrefactive and undesirable bacteria was very small in most cases. The percentage of acidity varied from 0.171 to 0.198, and averaged 0.186. It should be remembered that all samples were 3 days old when tested. The scores varied from 87 to 98, and averaged 94.8. There was no sediment found in any of these samples.

The medals and diplomas in this class were awarded as follows:

Number of sample and name of exhibitor.	State.	Score.	Award.
104. S. M. Shoemaker	Maryland	98	Gold medal.
105. Frank J. Carr	New York	97	Silver medal.
101. Wawa Dairy Farm	Pennsylvania	96	Diploma.
107. Towar's Wayne County Creamery Co	Michigan	95½	Do.
102. St. Louis Dairy Co	Missouri	95	Do.
106. Woodend Farm Co	Minnesota	95	Do.

One entry not included above failed to reach the diploma mark (95), and one was barred from competition.

CONDITIONS UNDER WHICH THE CERTIFIED MILK WINNING THE GOLD MEDAL WAS PRODUCED.[a]

The building in which the cows were stabled was a single story, with concrete and glass sides, plastered ceiling, concrete floors, individual watering device, and a modern system of ventilation. (See pl. 3.) The cows were principally grade Shorthorns, with a few grade Holsteins. Previous to milking the fore milk was drawn into a small cup at the side of the milk pail. The pail had a small aperture over which was drawn a sterile cheese cloth, a fresh cloth being used for each cow. The milk was promptly removed from the barn and run over a cooler and bottled as quickly as possible. The feeds used were those ordinarily approved for cattle, cotton-seed meal and silage being used moderately.

DESCRIPTION OF THE DAIRY PRODUCING THE CERTIFIED MILK WHICH WON THE SILVER MEDAL.

The cows are kept in a basement barn with concrete floor. The stable is well lighted and ventilated. The herd of 200 cows is composed of Brown Swiss, Jerseys, and a few Holstein-Friesians.

[a] The same exhibitor also won the silver medal in the cream contest.

The dairy building is all concrete, built upon the most approved plans, and equipped with modern dairy utensils. After milking, the milk is simply run over a cooler, bottled, and iced.

THE AWARDS IN CLASS II—MARKET MILK.

There were 23 entries in this class, and all of the milk was sound and sweet when tested. A great variety of flavors were found in the samples exhibited in this class; one had a pronounced silage odor, two or three had a suggestion of a cowy odor, etc. The percentage of butter fat in the various samples ranged from 2.6 to 7.1, and averaged 4.5. All but two samples passed the standard of 3.25 per cent which was used in this test. The total solids ranged from 11.42 to 16.38 per cent, and averaged 13.49, all but two passing the standard of 12 per cent. The acidity ranged from 0.171 to 0.258 per cent, and averaged 0.200; three were above the standard of 0.225 per cent. The total bacteria ranged from 400 to 21,000,000 per cubic centimeter; leaving out the highest count (21,000,000), the average was 39,273. The liquefying bacteria ranged from 0 to 710,000, and averaged 43,204. The total score ranged from 71 to 96, and averaged 89.7.

The following were awarded medals or diplomas in this class:

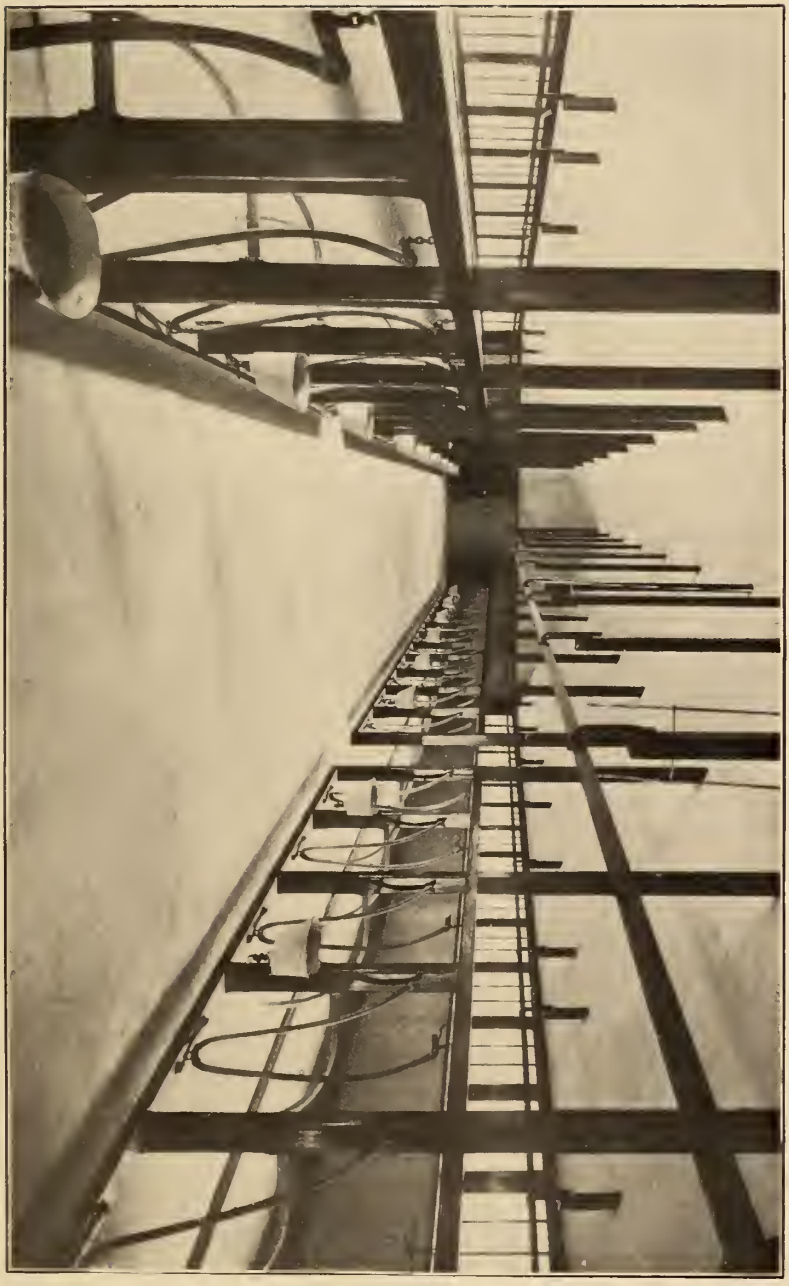
Number of sample and name of exhibitor.	State.	Score.	Award.
213. Wyatt & Son	Wisconsin	96	Gold medal.
223. S. Edwin Thornton	Maryland	95½	Silver medal.
201. N. N. Rose	New York	95	Diploma.
229. Storrs Experiment Station	Connecticut	95	Do.
222. H. P. Hood & Sons	Massachusetts	94	Do.
207. Mrs. N. E. Parrish	Kansas	94	Do.
205. C. E. Hill	Illinois	93½	Do.
209. S. M. Shoemaker	Maryland	93	Do.
204. Wieland Dairy Co	Illinois	93	Do.
202. L. P. Bailey	Ohio	92	Do.
210. J. Gilbert Hickcox	Wisconsin	92	Do.
217. A. E. Thompson	Illinois	90	Do.
208. Union Dairy Co	do	90	Do.

Ten in this class, not included above, failed to reach the diploma mark (90).

CONDITIONS UNDER WHICH THE MARKET MILK RECEIVING THE GOLD MEDAL WAS PRODUCED.

The herd consists of choice purebred and grade Jerseys, numbering about 30 milking cows. It is the practice of the owner to raise heifer calves from the best cows. The barn is well lighted and ventilated, the floors are of cement, and the walls and ceiling are kept thoroughly whitewashed. The manure from the stables is hauled direct to the field.

The feed used in this dairy consists of corn silage (well eared), shredded corn stover, and mixed hay for roughage, the grain part consisting of wheat bran and middlings and buckwheat middlings, besides the corn in the silage. Care is taken during milking to have as little dust as possible in the barn. The cows are kept thoroughly clean.



Interior of Stable where Certified Milk Winning Gold Medal was Produced.

Fig. 1.—Interior of Dairy House where Market Milk Receiving Gold Medal was Handled.

Fig. 2.—Some of the Cows which Produced Market Milk Receiving Gold Medal.

The milk from each cow is weighed after milking, and as soon as a small can is filled it is taken to a separate building used only for handling milk. Here the milk is strained through a wire strainer and three cloth strainers and stored in cold water until bottled. After bottling, the milk is placed in cases and packed in ice ready for delivery. All dairy utensils are rinsed, washed, scalded with boiling water, and drained. The herd is tuberculin tested and great care is exercised to keep it healthy.

The milk retails at 6 cents per quart throughout the year in a small town of 3,000 inhabitants. The owners take much pride in producing clean milk free from dangerous germs.

DESCRIPTION OF THE DAIRY WHICH PRODUCED THE MARKET MILK WINNING THE SILVER MEDAL.

The barn is a frame structure of ordinary type. The herd of 28 cows is of mixed breeding, and includes Jersey, Holstein, and Shorthorn grades. The cows are fed a well-balanced ration the year round. When the milk was produced for the contest the ration consisted of millet hay and cut corn stover, supplemented with corn and cob meal, dried brewers' grains, and molasses feed. The milk was produced and handled in a cleanly manner, cooled and aerated immediately after being drawn, and stored in spring water.

THE AWARDS IN CLASS III—CREAM.

The exhibits of this product were of a very fine character, considering that they were three days old when scored and that some of them had been shipped from a distance of over a thousand miles. The percentage of fat in the various cream samples ranged from 17 to 44, the acidity from 0.171 to 0.270. One only was found to be above the acidity standard of 0.25 per cent. The total bacteria ranged from 0 to 2,810,000. The number of liquefying bacteria ranged from 0 to 76,000. The total scores ranged from 86 to 98, and averaged 93.6.

The awards in the cream contest were as follows:

Number of sample and name of exhibitor.	State.	Score.	Award.
315. Storrs Experiment Station	Connecticut	98	Special gold medal.
308. Union Dairy Co.	Illinois	97	Gold medal.
309. S. M. Shoemaker	Maryland	96½	Silver medal.
314. Frank E. Headley	Missouri	96	Diploma.
301. M. N. Ross	New York	96	Do.
311. Cott Barnett	Indiana	95½	Do.
303. L. P. Bailey	Ohio	95	Do.
304. Grace G. Durand	Illinois	95	Do.
310. J. Gilbert Hickcox	Wisconsin	95	Do.
316. Towar's Wayne County Creamery	Michigan	93	Do.
307. R. F. Shannon	Pennsylvania	91½	Do.
305. U. A. Towers	Wisconsin	91	Do.

Three in this class, not included above, failed to reach the diploma mark (90).

CONDITIONS UNDER WHICH THE CREAM RECEIVING THE SPECIAL GOLD MEDAL WAS PRODUCED.

The milk from which the cream was taken was the mixed milk of a herd made up of purebred Jerseys, Guernseys, Ayrshires, and Holstein-Friesians.

The grain fed consisted of a mixture of 400 pounds wheat bran, 100 pounds cotton-seed meal, and 100 pounds corn meal, 6 to 8 pounds of this mixture being fed to each cow. For roughage each cow received 40 pounds of silage and 5 pounds of hay. Previous to milking, the udders were wiped with a damp cloth and the milk was drawn into covered milk pails. After being drawn, the milk was taken at once to the dairy, separated by means of a centrifugal separator, and immediately cooled and iced.

LESSONS FROM THE CONTEST.

THE KEEPING QUALITIES OF SANITARY MILK.

As stated at the outset, the object of this contest was wholly educational. It was desired to show that milk and cream produced under sanitary conditions could be shipped long distances and held for several weeks without any other means of preservation than cleanliness and cold. The results were most gratifying, and some of the samples remained perfectly sweet after being shipped a thousand miles across the country, put in storage at a temperature of about 32° F. for two weeks, and then reshipped a distance of 900 miles to Washington, D. C., where they were stored in an ordinary ice box for several weeks longer, some of the certified milk samples being still sweet after five weeks. A part of a box of cream entered in this contest was placed in cold storage in Chicago at a temperature of 33° F. and remained sweet and palatable for a period of seven weeks.

SUPERIORITY OF CERTIFIED OVER MARKET MILK.

The so-called certified milk entered in this contest was quite superior to the market milk, the total scores averaging 94.8 and 89.7, respectively. This result goes to show that certified milk is a superior article, and is actually worth more when we consider its better flavor and keeping quality and freedom from objectionable bacteria, and, further, the fact that the richness of the milk is guaranteed. It is apparent that the producer of certified milk must be a thoroughly capable man. He must understand matters pertaining to the healthfulness of cows, the effect of disease or any inflammation or unusual condition of the cow upon the milk, also the composition and effect of the various feeding stuffs on the cows, the effect of overfeeding, and unusual disturbances which affect the quality or flow of the milk; he must have some knowledge of bac-

teria and know the importance of sterilizing utensils, which are sources of bacterial contamination. He must appreciate the fact that injudicious feeding of turnips, garlic, ragweed, and unsound silage will produce undesirable flavors in milk, and must know how to guard against them. The work of the producer of certified milk is often too little appreciated by those who require such milk for the sick room, infants, etc. They should rejoice in the fact that by paying a little higher price than that charged for ordinary milk a product can be secured that is guaranteed to be rich, pure, clean, wholesome, and produced from healthy cows.

It may be said concerning the market milk exhibited that a large percentage of the samples remained sweet for a week in the exhibit case, the temperature of which was about 50° F. While these samples probably represented a very much higher quality of milk than that ordinarily supplied to our cities, it may be said to be demonstrated that market milk will keep for several days if handled with reasonable care and held at a temperature below 50° F.

While no definite percentage of fat was specified for market milk except that it should be above the standard of 3.25, it is of interest to note the wide variations shown in the 23 samples exhibited, namely, 2.6 to 7.1, the average being 4.5. It is known that such wide variations are not uncommon in the milk supplied to many of our cities.

It may be stated that these wide variations occur not only in the milk supplied by different dealers, but in the milk from the same dealer from day to day, particularly where the "dippage" system is practiced. These variations may be due to not properly mixing the milk from the different cows, or failing to mix the milk in the can before dipping it out. This results in dissatisfaction on the part of the consumers, for the reason that they do not want cream delivered to them one day and a product approaching skim milk the next. This question of uniformity is one of great importance to both producer and consumer.

SANITARY METHODS MORE IMPORTANT THAN BREED OF COWS.

The fact is also of interest that both the milk and the cream which won the medals in the contest were produced from herds that were largely of mixed breeding. This indicates that the sanitary conditions under which milk is produced and the method of handling it are of more importance than the fact that the animals are purebred or that they are of some particular breed.

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CONTROL AND ERADICATION OF CONTAGIOUS DISEASES.

Inspectors in charge of districts.

Dr. R. A. Ramsay, room 320 Quincy Building, Denver, Colo., in general charge of eradication of scabies of sheep and cattle in the West.
Albuquerque, N. Mex.—Dr. Louis Metsker, room 22 N. T. Armijo Building.
Denver, Colo.—Dr. Lowell Clarke, room 320 Quincy Building.
Fargo, N. Dak.—Dr. R. H. Treacy.
Kansas City, Kans.—Albert Dean, room 328 Live Stock Exchange.
Salt Lake City, Utah.—George S. Hickox, room 21 Eagle Block.

INSPECTION OF LIVE STOCK FOR EXPORT.

Inspectors in charge.

Baltimore, Md.—Dr. H. A. Hedrick, 215 St. Paul street.
New York, N. Y.—Dr. W. H. Rose, 18 Broadway.
Norfolk, Va.—Dr. G. C. Faville, P. O. box 796.
Philadelphia, Pa.—Dr. C. A. Schaufler, 134 South Second street.
Portland, Me.—Dr. F. W. Huntington, U. S. customs office, Grand Trunk R. R. wharf.

INSPECTION AND QUARANTINE OF IMPORTED ANIMALS.

Quarantine stations.

Athenia, N. J. (for the port of New York).—Dr. George W. Pope, superintendent.
Halethorp, Md. (for the port of Baltimore).—William H. Wade, superintendent.
Littleton, Mass. (for the port of Boston).—Dr. J. F. Ryder, inspector in charge, 141 Milk street, Boston, Mass.

Inspectors on the Canadian border.

Calais, Me.—Dr. H. T. Potter.
Carthage, N. Y.—Dr. W. S. Corlis.
Detroit, Mich.—Dr. L. K. Green, care Hammond, Standish & Co.
Fort Fairfield, Me.—Dr. F. M. Perry.
Malone, N. Y.—Dr. H. D. Mayne.
Newport, Vt.—Dr. G. W. Ward.
Ogdensburg, N. Y.—Dr. Charles Cowie.
Orono, Me.—Dr. F. L. Russell.
Port Huron, Mich.—Dr. David Cumming, 912 Lapeer avenue.
St. Albans, Vt.—Dr. C. L. Morin.
Sault Ste. Marie, Mich.—Dr. J. F. Deadman.

Inspectors on the Mexican border.

El Paso, Tex.—Dr. Thomas A. Bray.
San Antonio, Tex.—Dr. Joseph W. Parker.
San Diego, Cal.—Dr. Robert Darling, care Charles S. Hardy.

VETERINARY INSPECTORS STATIONED ABROAD.

Dr. W. H. Wray, 34 Streatham Hill, London, S. W., England, in charge for Great Britain and Ireland.
Dr. T. A. Geddes, care U. S. consulate, Liverpool, England.
Dr. V. A. Nörgaard, Honolulu, Hawaii.

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